In the Specification:

Please amend the specification as shown:

Please delete paragraph [0017] and replace it with the following paragraph:

[0017] FIG. 1A illustrates the chemical structure of a negatively charged peptide-amphiphile that may be considered a platform for preferred embodiments of the present application **(SEQ ID NO: 1)**; FIG. 1B illustrates the chemical structure of a positively charged peptide-amphiphile of the present invention **(SEQ ID NO: 22)**; FIG. 1C illustrates a space filling model of the negatively charged peptide amphiphile of FIG. 1A;

Please delete paragraph [0032] and replace it with the following paragraph:

[0032] Segment B is a structural segment that covalently links the alkyl tail to the hydrophilic head group. The structural segment is covalently bonded at one end to the alkyl tail and at its other end is covalently bonded to the hydrophilic head group. If cross-linking is desired, cysteine amino acids may be utilized in this segment. If cross-linking is not desired, other amino acids such as but not limited to alanine, serine, or leucine may be used in this region (e.g. SLSL **(SEQ ID NO: 23)** or AAAA **(SEQ ID NO: 24)** as described in more detail herein). This cysteine-free system may be more appropriate for in situ biological applications where the environment may be more difficult to regulate. The SLSL **(SEQ ID NO: 23)** modification to the system is expected to lead to a slower assembly of the nanofibers. Without wishing to be bound by theory, it is believed that the bulky leucine side chains may require more time to pack into the fiber. A slowed self-assembly may also have greater applications in a functional, in situ environment such as an operating room, where it may be advantageous to have delayed formation of the nano-fibers. The structural segment may also include a flexible linker composed of glycine or other amino acids. When the structural segment includes hydrophobic amino acids, it and the alkyl tail may be considered a

hydrophobic segment. Where the structural segment includes hydrophilic amino acid, it and the hydrophilic head group may be considered as a hydrophilic segment.

Please delete paragraph [0035] and replace it with the following paragraph:

[0035] The highly negatively charged peptide amphiphiles include charged amino acid sequences, such as serine, phosphorylated serine, and aspartic acid. Examples of such peptide amphiphiles include but are not limited to those in SEQ ID NO: 1-21. A highly positively charged peptide amphiphile, SEQ ID NO:22, $C_{16}H_{31}O$-SLSLDprDprDprGRGDS may be used as a co-assembling peptide amphiphile to be mixed with useful negatively-charged molecules. This molecule, containing the GRGDS **(residues 8-12 of SEQ ID NO: 22)** peptide sequence derived from adhesive proteins like fibronectin, would be expected to promote cell adhesion. This molecule is expected to have a (+3) charge at neutral pH. Higher positive charges for a peptide amphiphile could be obtained by increasing the number of 2,3-diaminopropionic acid, Dpr, units. Alternatively, the Dpr units could be replaced with residues including, but not limited to, lysine, arginine, or other positively-charged amino acids. Peptide components of the invention preferably include naturally occurring amino acids and artificial amino acids. Incorporation of artificial amino acids such as beta or gamma amino acids and those containing non-natural side chains, and/or other similar monomers such as hydroxyacids are also contemplated, with the effect that the corresponding component is peptide-like in this respect.

Please delete paragraph [0038] and replace it with the following paragraph:

[0038] The peptide amphiphile, SEQ ID No:1, shown in FIG. 1A, contains the highly charged peptide sequence SS(P)DS(P)D **(residues 8-12 of SEQ ID NO: 1)**, a sequence specifically chosen to model the protein phosphophoryn (FIG. 1A). Phosphophoryn is found in dentin and contains large numbers of aspartic acid and phosphoserine residues in repeat sequences of [SDS] and [DSS]. The [SDS] repeat gives phosphoserines paired along the same edge of the extended chain, with a negatively charged aspartic acid residue in between. Phosphophoryn plays a role in the biomineralization

process where it is thought to both nucleate and inhibit crystal growth depending on the reaction conditions. The negative charge of repeating [SD] is thought to have a strong calcium binding potential and lead to a local concentration of ions. Emulation of the [SDS] motif in the design of the PA gives the PA an overall –7 charge for its functional peptide head.

Please delete paragraph [0057] and replace it with the following paragraph:

[0057] This example illustrates the self assembly of negatively charged peptide amphiphiles using positively charged peptide amphiphiles, coassembly, to induce nanofiber gel formation. An aliquot of 50 mL of 10 mg/mL SSDSD PA, SEQ ID NO: **25**[[1]], was mixed with 150 mL, approximately 3 molar equivalents, of $C_{16}H_{31}O$-SLSLDprDprDprGRGDS, SEQ ID NO:22. The resulting coassembly forms a self-supporting PA nanofiber gel. Similar approaches may be applied using variations the charged molecules involved.

Please delete paragraph [0075] and replace it with the following paragraph:

[0075] This example illustrates hydroxyapatite mineralization of a titanium surface coating of self assembled peptide amphiphiles having an SSDSD, SEQ ID NO: **25**[[1]], peptide sequence. 1mL of 1 mg/mL solution of SSDSD-PA, SEQ ID NO: **25**[[1]], was treated with by addition of 25 mL of 200 mM $CaCl_2$ to form PA nanofibers. Titanium foils were subsequently dipped into this nanofiber suspension and excess liquid was wicked from the foil, leaving a thin film of peptide amphiphile, SEQ ID NO:1, suspension on the foil surface. This film was dried onto the foil surfaces by vacuum desiccation. The foil was subsequently treated with 2 mL of 2 mM $CaCl_2$, 2 mM b-glycerolphosphate, supplemented with 20 mL of 2 mg/mL alkaline phosphatase. Samples were treated in this solution for 7 days. The SEM in FIG. 11 reveals hydroxyapatite-mineralized fibers on the titanium surface. The coarsely mineralized nanofiber matrix on the right side of FIG. 11 is seen gradually thinning toward the left of FIG. 11. Unmineralized fibers are indicated in the top left of FIG. 11 by the arrow. This illustrates the biomimetic mineralization of the SSDSD, SEQ ID NO: **25**[[1]], nanofibers. Without wishing to be bound by theory, during the calcium-induced self-

assembly, phosphorylated serines and aspartic acid residues on the nanofiber exterior are believed to have bound calcium. This calcium, displayed on the fiber exterior is appropriately available for the mineralization when exposed to free phosphates. In this biomimetic system, the phosphates are slowly introduced for mineralization only as the osteogenic enzyme alkaline phosphatase cleaves the phosphate from the b-glycerolphosphate. This gradual phosphate introduction allows for directed, templated growth of hydroxyapatite on the nanofiber surfaces.